PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43*bis*.1)

Applicant's or agent's file reference see form PCT/ISA/220	Date of mailing *(day/month/year)* see form PCT/ISA/210 (second sheet) **FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/IB2005/051242	15.04.2005	20.04.2004

International Patent Classification (IPC) or both national classification and IPC
C01B31/02, B32B7/00, G01N27/12

Applicant
KONINKLIJKE PHILIPS ELECTRONICS N.V.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:	Authorized Officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Marucci, A Telephone No. +49 89 2399-7819

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material:

   ☐ a sequence listing

   ☐ table(s) related to the sequence listing

   b. format of material:

   ☐ in written format

   ☐ in computer readable form

   c. time of filing/furnishing:

   ☐ contained in the international application as filed.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	7-12
	No:	Claims	1-7
Inventive step (IS)	Yes:	Claims	8-12
	No:	Claims	1-7
Industrial applicability (IA)	Yes:	Claims	1-12
	No:	Claims	

2. Citations and explanations

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item V.

1 Reference is made to the following documents:

D1 : WO 00/63115 A (COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION; DAI, LIM) 26 October 2000 (2000-10-26)
D2 : PATENT ABSTRACTS OF JAPAN vol. 2000, no. 25, 12 April 2001 (2001-04-12) &; JP 2001 236878 A (SHARP CORP), 31 August 2001 (2001-08-31)
D3 : DAI H: "Carbon nanotubes: opportunities and challenges" SURFACE SCIENCE, NORTH-HOLLAND PUBLISHING CO, AMSTERDAM, NL, vol. 500, no. 1-3, 10 March 2002 (2002-03-10), pages 218-241, XP004693300 ISSN: 0039-6028

2 INDEPENDENT CLAIM 1:

2.1 Document D1 discloses (the references in parentheses applying to this document): a multilayered device made of one (or more) layer of carbon nanotube included between a substrate and a cover layer (page 6, line 22-page 7, line 24). The device can be used for several applications as for instance as chemical and biological sensor (page 7, line 26- page 8, line 11).

2.2 Document D2 discloses a field-emission-type electron source array comprising a layer of carbon nanotubes between other functional layers (abstract).

2.3 As can be seen from the above, documents D1 and D2, taken separately, disclose in combination all the features defined in independent claim 1. Hence the subject-matter of this claim is not new (Article 33(2) PCT).

3 INDEPENDENT CLAIM 7

The same reasoning applies mutatis mutandis to the subject-matter of the corresponding independent claim 7 which is therefore also lacking novelty (Article 33(2) PCT).

4 DEPENDENT CLAIMS 2-6

Dependent claims 2-6 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step (Article 33(2) and (3) PCT).

5 INDEPENDENT CLAIM 8

5.1 Document D3, which is considered to represent the most relevant state of the art, discloses ("Controlled nanotube growth by chemical vapor deposition"):
a method for preparing arrays of aligned carbon nanotubes by chemical vapor deposition.
From this, the subject-matter of independent claim 8 differs in that the growth of carbon nanotubes occurs between two layers, so that the carbon nanotube's array formed is covered by a layer.
The subject-matter of claim 8 is therefore novel (Article 33(2) PCT)

5.2 The problem to be solved by the present invention may be regarded as:
avoiding a post-synthesis deposition of a cover layer on the nanotube array.

5.3 The solution to this problem proposed in claim 8 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:
the claimed method avoids an additional step to the preparation of the final device (page 3, lines 3-6) and improves the quality of the nanotubes and of the resulting device (page 9, line 24- page 10, line 6).

5.4 Claims 9-12 are dependent on claim 8 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

Re Item VIII.

6 Claims 1, 7 and 8 are not supported by the description as required by Article 6 PCT, as their scope is broader than justified by the description and drawings. The reasons

therefor are the following:

6.1 Claim 1 (and consequently also claim 7) relates to a large number of possible products (all possible materials are included in the scope of the claim as well as all possible "nanosized filamentary" shapes like for instance: nanotubes, nanowires, nanofibers). Support within the meaning of Article 6 PCT is to be found, however, for only a very small proportion of the products claimed, that is to say for a device in which the "nanosized filamentary material" are carbon nanotubes.

6.2 In claim 8 the method for growing the "nanosized filamentary material" is not specified. It is known that for instance carbon nanotubes can be prepared by a variety of methods like for instance: laser ablation, pyrolisis, CVD, arc discharge (D3, "Nanotube growth"). However, doubts arise if any method is successful for growing "nanosized filamentary material" between layers comprised in a stack. The laser ablation process, for instance, would not be suitable for such a growth.
The subject-matter of claim 8 should, therefore, be limited to the method reported in the example. Furthermore, what the objection in 6.1 applies mutatis mutandis for the subject-matter of this claim.

7 The vague and imprecise statement in the description on page 13, line 30 "without departing fro the spirit of the invention" implies that the subject-matter for which protection is sought may be different to that defined by the claims, thereby resulting in lack of clarity (Article 6 PCT) when used to interpret them.

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